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New records of phoretic and soil-living mites from Iran (Acari, Heterostigmata, Scutacaridae)

Ernst EBERMANN[1], Hamid-reza HAJIQANBAR[2] &
Karim HADDAD IRANI-NEJAD[3]

[1] Institut für Zoologie, Karl-Franzens-Universität, Universitätsplatz 2, A-8010 Graz, Austria. E-mail: ernst.ebermann@uni-graz.at

[2, 3] Department of Plant Protection, Faculty of Agriculture, Tabriz University, Postal Code: 51664, Tabriz, Iran. E-mails: hajiqanbar@yahoo.com, khaddad@tabrizu.ac.ir

New records of phoretic and soil-living mites from Iran (Acari, Heterostigmata, Scutacaridae). - *Scutacarus iranicus* sp. n. is described from the West-Azarbaijan province (northwestern Iran). The new species was found to be phoretic on the scarabaeid beetle *Pleurophorus anatolicus* Petr. At the same locality, but in the soil, other scutacarids were found: *Scutacarus quadrangularis* (Paoli, 1911), *Scutacarus serotinus* Sevastianov & Chydyrov, 1992, *Pygmodispus (Allodispus) latisternus* Paoli, 1911 and *Pygmodispus (Pygmodispus) calcaratus* Paoli, 1911. These species are recorded for the first time from Iran.

Key-words: Acari - Scutacaridae - new species - phoresy - scarabaeid beetle - Iran.

INTRODUCTION

The scutacarid fauna of Iran is almost unknown. In 1970 Mahunka & Rohde described the new species *Heterodispus verrucosus* and this was the first record of a representative of the mite family Scutacaridae from Iran. Since this record, only a few additional species have been reported (Kamali *et al.*, 2001): These are *Imparipes parapicolosimilis* Metwaly, 1971, *Scutacarus longitarsus* (Berlese, 1905), *Scutacarus fragariae* Rack, 1975 and *Scutacarus contiguus* Delfinado, Baker & Abbatiello, 1976. Pedobiological collections from sugarbeet-fields in northwestern Iran (by the second author, H. H.) yielded some scutacarid species which are presented here.

MATERIAL AND METHODS

Locality: Miandoab plain, West-Azarbaijan province (northwestern Iran), sugarbeet fields. Dates of collecting: sample-number 1: April 19, no.2: May 4, no.4: May 15 and May 16, no.5: May 15, no.6: September 14. All soil samples were collected by H. H. in 2000. Mites and beetles were extracted by using Berlese-Tullgren-funnels.

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The mites were determinated by the first author (E. E.), the beetles by F.-T. Krell. The material was collected in course of investigations for the master thesis of the second author (H. H.) under the supervision of the third author (K. H.)

The following abbreviations are used in the description: ap. = apodeme, Fe = femur, Ge = genu, lTa = length of tarsus, lPrTa = length of pretarsus, PrTa = pretarsus, pstpl = posteriore sternal plate, sol = solenidion, Ta = tarsus, Ti = tibia, TiTa = tibiotarsus, Tr = trochanter, x= average, = =about the same length, < = shorter than, > = longer than.

RESULTS

Description of the new species

Scutacarus iranicus sp. n. (female) Figs 1-3

Material and deposition: 8 ♀♀ from sample 6. Holotype specimen and four paratypes in the Muséum d'histoire naturelle Genève (Switzerland), two paratypes in the Zoologisches Institut und Zoologisches Museum, University of Hamburg (Germany), one paratype in the Acarological Collection, Zoological Museum, College of Agriculture, Tehran University, Karaj (Iran).

Diagnosis: *Scutacarus iranicus* sp. n. is characterized by the comparatively rare feature "setae e and h1 tiny". It shares this feature with little more than 20 species, which have tiny or completely reduced setae e. *Scutacarus iranicus* sp. n. is most closely related to the „*tackei*-species group". Members of this group are *Scutacarus tackei* Willmann, 1942, *S. ellipticus* Karafiat, 1959, *S. suborbiculatus* Rack, 1964 and *S. terrenus* Delfinado & Baker, 1976.

The most important differences between *S. iranicus* sp. n. and *S. tackei* are: *iranicus*: alveolar canals of setae c1 and c2 long, *tackei*: only in c2 long; *iranicus*: h1 somewhat longer than f, *tackei*: h1 two times longer than f; *iranicus*: 3b arising far in front of 3a and 3c, *tackei*: 3a, 3b and 3c nearly in one line; *iranicus*: ps1 and ps2 < 4a, with only a few barbs, *tackei*: ps1 = 4a or ps1 > 4a, ps1 and ps2 densely barbed; *iranicus*: tip of claw of legI rather blunt, *tackei*: claw with thin, elongated tip; *iranicus*: sol ω1 > φ1, *tackei*: ω1 = φ1; *iranicus*: tc"IV thick with strong spines, *tackei*: tc"IV thin with fine barbs.

The most important differences between *S. iranicus* and *S. ellipticus* are: *iranicus*: c1, c2 and d distally smooth or sparsely barbed, *ellipticus*: c1, c2 and d distally densely barbed; *iranicus*: f slightly thinner than d, *ellipticus*: f distinctly thinner than d; *iranicus*: 4b and 4c being the thickest of all ventral setae, *ellipticus*: 4b and 4c very thin; *iranicus*: ps1 > ps2, with only a few barbs, ps1 and ps2 < 4a, *ellipticus*: ps1 = ps2, both setae densely barbed, ps1 and ps2 > 4a; *iranicus*: e and h2 tiny, *ellipticus*: e and h2 completely reduced; *iranicus*: claw of leg I large, tip of the claw rather blunt, *ellipticus*: claw small with very thin, elongated tip.

The most important differences between *S. iranicus* and *S. suborbiculatus* are: *iranicus*: d > f, *suborbiculatus*: f > d; *iranicus*: 3b arising far in front of 3a and 3c, 3a, 3b, 3c shorter than in *suborbiculatus*, 3c not reaching insertion of 4b, *suborbiculatus*: 3a, 3b and 3c standing in one line, these setae longer than in *iranicus*, 3c extending beyond insertions of 4b; *iranicus*: e and h2 tiny, *suborbiculatus*: e and h2 completely

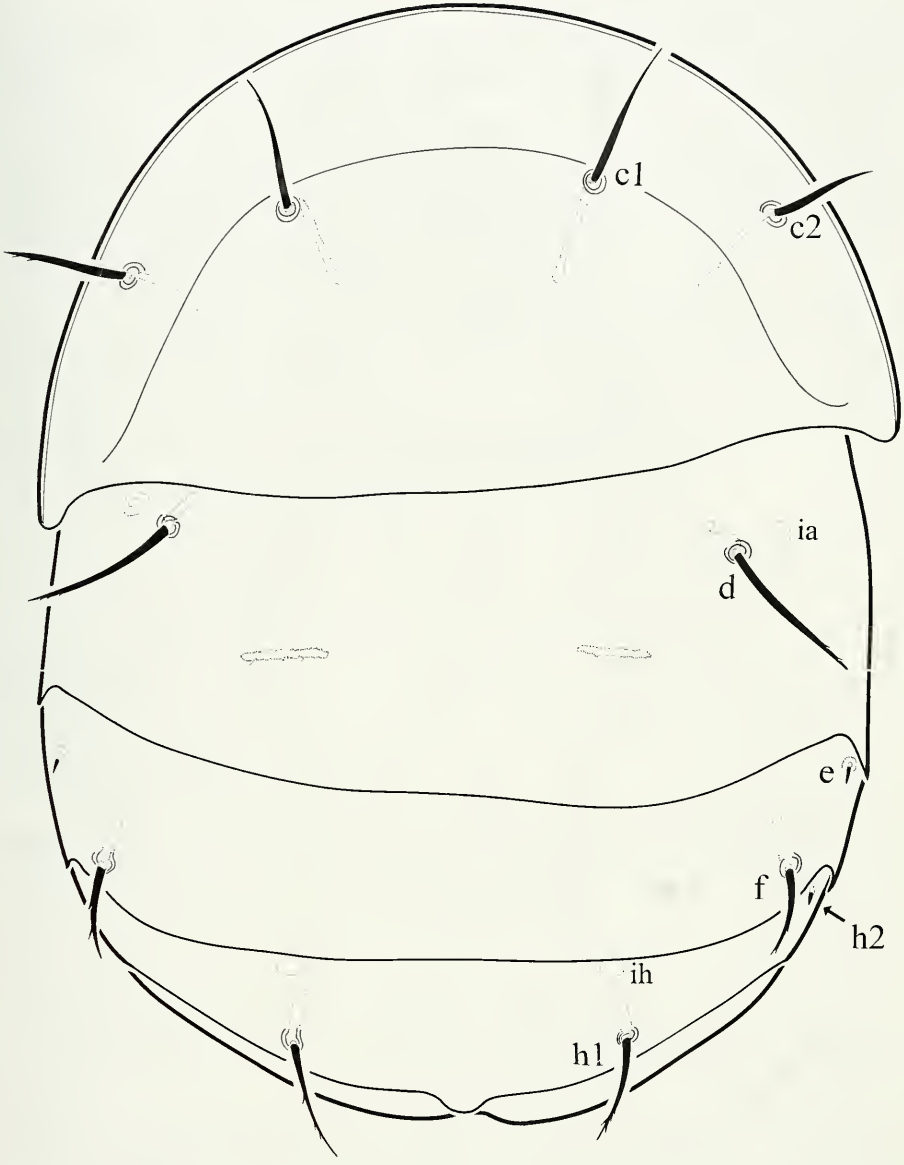

FIG. 1
Scutacarus iranicus sp. n. (female holotype) – dorsal view; body length 190 µm.

reduced; *iranicus*: tip of claw of leg I rather blunt, *suborbiculatus*: claw with very thin, elongated tip.

The most important differences between *S. iranicus* and *S. terrenus* are: *iranicus*: TiTa I with 4 solenidia, *terrenus*: TiTa I with 3 solenidia only.

FIG. 2
Scutacarus iranicus sp. n. (female holotype) – ventral view.

Description: Body dimensions (measurements in µm): Total body length (measured on about one year old microscopic slides) 146 – 190, x = 167 (n = 8), holotype 190; width pstpl (measured along anterior margin of the plate): 65 – 80, x = 74 (n = 8), holotype 79.

Entire surface of the body with tiny pores; cupulae ia and ih roundish.

Dorsum (Fig. 1): free margin of tergite C with fine, radiating stripes (not illustrated in Fig. 1); alveolar canal of all dorsal setae, except e and h1, visible. Dorsal setae smooth or moderately barbed, their relative length: c1 > c2 < d > e < f < h1 > h2, h1 only slightly longer than f, e and h2 tiny.

Venter (Fig. 2): ap.1, 2, 3 strongly developed, ap.4 extended, ap.5 reduced. Ventral setae strongly barbed or moderately barbed or smooth, somewhat varying in length. Relative length: 1a > 1b > 2a or 1b = 2a, 2a = 2b. 2b dagger-shaped, smooth. 3a < 3b < 3c, 3b arising in front of 3a and 3c; 4a < 4b > 4c, 4b standing a short distance in front of 4a; ps1>ps2 >ps3, ps1 and ps2 close to each other. Genital sclerite broader than long, anterior genital sclerite laterally with sclerotized structures.

Trichobothrium sc1 (Fig. 3b): club-shaped, thin-stemmed, with fine scales, outer seta v1 somewhat longer than v2 or reverse.

Extremities: Leg I (Fig. 3c): Setal formula: Tr 1, Fe 2, Ge 4, TiTa 16 (4sol), sol ω2 < ω1 > φ2 < φ1, ω2 thin, ω1 and φ2 standing side by side, ω1 finger-shaped, φ2 thin, φ1 club-shaped, thin-stemmed; TiTa with large claw, tip of the claw rather blunt. Leg II (Fig. 3d): Setal formula: Tr 1, Fe 3, Ge 3, Ti 4(sol φ), Ta 6 (sol ω); Ta with 2 claws and pulvillus. Leg III (Fig. 3e): Setal formula: Tr 1, Fe 2, Ge 2, Ti 4 (sol φ), Ta 6; Ta with 2 claws and pulvillus. Leg IV (Fig. 3f): Setal formula: Tr 1, Fe 2, Ge 1, TiTa 7; tc' > pv" > tc", tc" with thick spines.

Male and larva: Unknown.

Bionomics: Specimens of the new species were several times found to be phoretic on the beetle species *Pleurophorus anatolicus* Petrovitz, 1961 (Scarabaeidae: Aphodiinae: Psammodiini). The mites were clinging to the sutures of the ventral side of the head and the suture between the forelegs and head.

Other identified species

Pygmodispus (Pygmodispus) calcaratus Paoli, 1911: Sample No. 5.

Some records from North America and Eurasia verify the holarctic distribution of this species.

Pygmodispus (Allodispus) latisternus Paoli, 1911: Sample No. 4.

This species is recorded from Western and Central Europe, as well as from Mongolia and North Africa.

Scutacarus quadrangularis (Paoli, 1911): Sample No. 1.

This is one of the most common scutacarid species, it is widely distributed in Eurasia and also recorded from Australia and New Zealand.

Scutacarus serotinus Sevastianov & Chydyrov, 1992: Sample No.2.

Hitherto this species was only known from Turkmenistan.

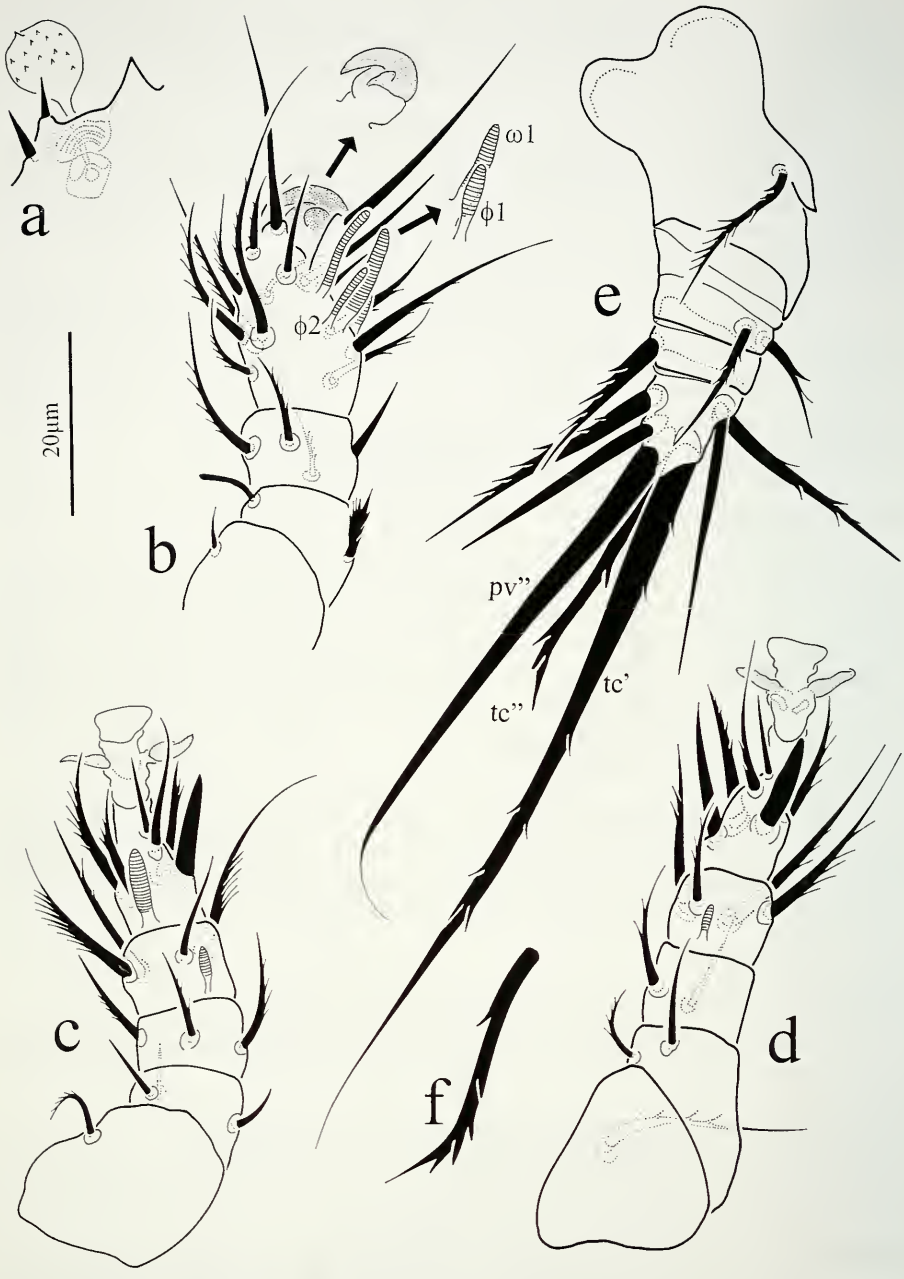

FIG. 3

Scutacarus iranicus sp. n. (female holotype) – a = trichobothrium, b = leg I (arrows: dorsal view of claw, solenidia ω1 and φ1), c = leg II, d = leg III, e = leg IV, f = seta tc" from opposite leg IV.

DISCUSSION

The finding of S. *iranicus* sp. n. on *Pleurophorus anatolicus* is especially remarkable as there is hardly anything known about associations between Scarabaeids and Scutacarids. Beetles of the family Scarabaeidae have only once been reported as phoretic hosts for Scutacarids: Norton (1973) discovered some phoretic ♀♀ of *Heterodispus* sp. on the North American Hermit Flower Beetle (*Osmoderma eremicola* Knoch). Amongst Coleoptera the family Carabidae is the most thoroughly investigated one. Beetles of this family are known to be used very frequently as phoretic hosts by a high number of scutacarid species, especially those of the genus *Archidispus* (e.g., Kurosa, 1991). Furthermore, some other beetles' families are known to be phoretic hosts (Ebermann, 1988).

With the five species recorded in this paper the number of scutacarid species recorded from Iran has been increased to ten. This number most probably still underestimates the actual number, considering the high number of species already known to occur in Eurasia. The remarkable geographical diversity of Iran and its rich ecological differentiation will deserve more targeted investigations in the future. Soil samples and insects, mainly beetles, ants and other Hymenoptera, can be expected to yield a high number of already described, and also of new species of phoretic and nonphoretic scutacarids.

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